



# SINGULAIR GREEN® BIO-KINETIC® WASTEWATER TREATMENT SYSTEM ANTI-FLOTATION INSTRUCTIONS

In areas where high groundwater is a concern, it may be necessary to provide additional anti-flotation measures to adequately secure the Singulair Green tank. Anti-flotation is not required when the tank is installed with at least 16" of fill over the tank and the soil density of the backfill is at least 100 pounds per cubic foot. Failure to follow the anti-flotation recommendations provided in this document may result in damage to the Singulair Green tank or shifting of the tank in the excavation and may void all or part of the limited warranty. The amount of soil cover over the tank is critical when calculating the anti-flotation requirements of a particular installation and should always be measured from the surface where the risers attach to the tank. The Singulair Green tank must be installed with a minimum of 6" soil cover over the tank to protect from long term exposure to the elements.

If anti-flotation is required, consult a soil scientist to measure the soil density. Once soil density and the amount of soil cover over the tank have been defined, refer to the chart on following page to determine the amount of additional hold down weight required.

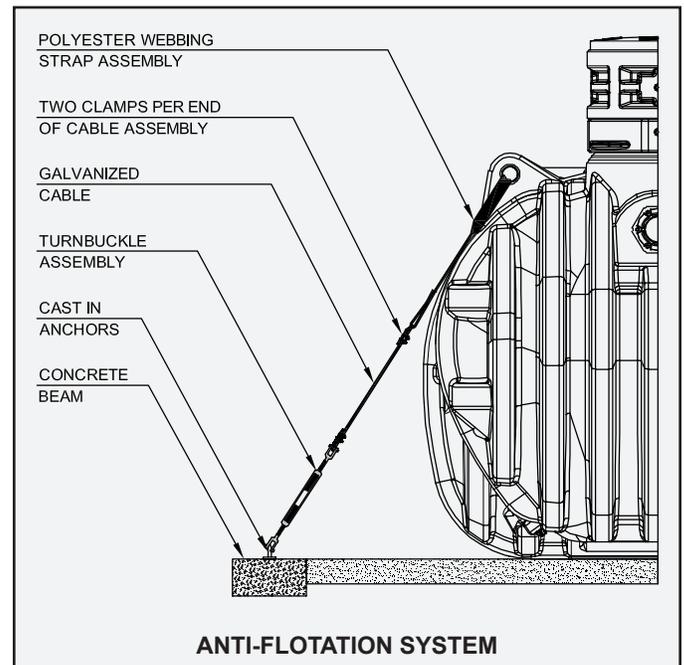
## ANTI-FLOTATION SYSTEM

The anti-flotation system for Singulair Green tanks consists of 3" wide 100% polyester straps that are fabricated into a loop on the ends. The polyester straps are installed through the molded lifting lugs in the Singulair Green tank and then attached to counterweight beams with galvanized anchors, mild carbon steel cables, clamps and turnbuckles. Each beam must include three galvanized anchors to insure that three hold down straps are used on each side of the tank. The weight of the soil over the counterweight beam must be calculated to insure adequate hold down weight is provided for each installation. To calculate the weight of the soil over the beams, use the formula provided on the following page. The maximum hold down force required to anchor the Singulair Green tank is 7,404 pounds. This is based on a tank installed with the minimum 6" soil cover and a soil density of 75 pounds per cubic foot. The calculations also assume groundwater is at grade and the Singulair Green tank is empty.

## INSTALLATION INSTRUCTIONS

When installing the counterweight beams, it is important that no part of the beam be installed directly underneath the Singulair Green tank. Installing the beams underneath the tank would minimize the amount of soil anchoring the beams into the ground. The beams should be installed with the top of the beam located below the bottom elevation of the Singulair Green tank. Refer to the drawing for proper location of the counterweight beams.

A total of six anchor strap assemblies must be used to secure the Singulair Green tank to the counterweight beams. Each anchor strap assembly must be rated to handle 1/6 of the total hold force required. A 2,500 pound rated strap assembly will be adequate to secure the tank in a worst case scenario with a safety factor of two.



Three anchor strap assemblies must be used on each side of the Singulair Green tank. To install the anchor strap assembly to the tank, first thread the polyester strap through a molded lifting lug located on the top of the tank and insert one end of the strap through the loop on the opposite end of the polyester strap. Connect the free end of the polyester strap to the carbon steel cable assembly. Connect the carbon steel cable assembly and the turnbuckle to the anchor on the counterweight beam. Repeat this process for the remaining five strap assemblies. Once all strap assemblies have been attached to the counterweight beam, adjust the turnbuckle on each strap assembly to insure that even tension is being applied to each of the strap assemblies. This insures that the hold down force is evenly distributed between each of the strap assemblies and anchor points.

## ANTI-FLOTATION INSTRUCTIONS (Cont.)

To calculate the additional hold down weight, please refer to the chart below.

WEIGHT OF SOIL OVER TWO BEAMS												
Length of Beam	x	Width of Beam	x	Depth of Soil Over Beam	÷	1,728	x	Soil Density	x	2	=	Weight of Soil Over Two Beams
(Inches)		(Inches)		(Inches)		(Cubic Inches/ Cubic Foot)		(lbs. per cu. ft.)		# of beams		(lbs.)

For worst case scenario, the calculation below utilizes 2"x12"x10' 0.6 CCA treated beams weighing 69 lbs. each.

WEIGHT OF SOIL OVER TWO BEAMS												
Length of Beam	x	Width of Beam	x	Soil Over Beam	÷	1,728	x	75	x	2	=	8,438
120 (Inches)		11.25 (Inches)		72 (Inches)		(Cubic Inches/ Cubic Foot)		(lbs. per cu. ft.)		# of beams		(lbs.)

NOTE: Add the weight of the beams to the weight of soil to calculate total hold down weight.

CALCULATION FOR TOTAL WEIGHT PROVIDED				
Weight of Soil	+	Weight of Two Beams	=	Total Weight of Soil and Beams
8,438 (lbs)		138 (lbs)		8,576 (lbs)

For your convenience, below is a chart with calculations for hold down weight requirements.

HOLD DOWN WEIGHT REQUIREMENTS												
Soil Density (lbs. per cu. ft.)	75	80	85	90	95	100	105	110	115	120	125	130
Fill Over Tank (inches)	Add'l Weight Required (lbs.)											
6	7404	6915	6425	5935	5445	4956	4466	3976	3486	2996	2507	2017
7	7018	6503	5987	5472	4956	4441	3925	3410	2894	2379	1863	1348
8	6632	6091	5550	5008	4467	3926	3384	2843	2302	1761	1219	678
9	6246	5679	5112	4545	3978	3411	2844	2277	1710	1143	576	9
10	5860	5267	4674	4081	3489	2896	2303	1710	1118	525	*	*
11	5474	4855	4237	3618	3000	2381	1763	1144	526	*	*	*
12	5087	4443	3799	3155	2510	1866	1222	578	*	*	*	*
13	4701	4031	3361	2691	2021	1351	681	11	*	*	*	*
14	4315	3619	2924	2228	1532	836	141	*	*	*	*	*
15	3929	3207	2486	1765	1043	322	*	*	*	*	*	*
16	3543	2796	2048	1301	554	*	*	*	*	*	*	*
17	3157	2384	1611	838	65	*	*	*	*	*	*	*
18	2770	1972	1173	374	*	*	*	*	*	*	*	*
19	2384	1560	735	*	*	*	*	*	*	*	*	*
20	1998	1148	298	*	*	*	*	*	*	*	*	*
21	1612	736	*	*	*	*	*	*	*	*	*	*
22	1226	324	*	*	*	*	*	*	*	*	*	*
23	840	*	*	*	*	*	*	*	*	*	*	*
24	453	*	*	*	*	*	*	*	*	*	*	*
25	67	*	*	*	*	*	*	*	*	*	*	*

\* HOLD DOWN WEIGHT NOT REQUIRED

- All calculations assume that groundwater is at grade.
- All calculations assume tank is empty.
- Buoyant force is calculated using the total equivalent weight of water assuming the tank is filled 100%. Weight of the tank and weight of soil over the tank is subtracted from the equivalent weight of water and a safety factor of 1.2 is applied.
- If using treated lumber for counterweight beams, insure beams are rated 0.6 CCA minimum.

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